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ABSTRACT

Focusing on the analysis of communication networks within organizations with an eye toward implications for study of external communication, this paper (1) develops a systems theory/communication view of the nature of formal organizations, (2) illustrates the notion of holistic organizational communication networks in organizations which include both formal and informal contact patterns, and (3) explores ways each might be helpful in studying the impact of internal organizational functions on external relationships and outcomes, or the impact of the suprasystem on internal relationships and functions. The following conclusions are drawn: that the concept of networks is embedded in the systems theory framework; that communication networks are crucial to the internal and external functions of an organization; that systems theory and network analysis each offer useful conceptual approaches to social and organizational research; and that, combined, they can be a powerful intellectual underpinning and impetus for internal and external organizational communication research and its applications in the professional field of public relations. (JD)

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A Systems Theory View of Organizations as Communication Networks

Donald F. Schwartz

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A SYSTEMS THEORY VIEW OF ORGANIZATIONS AS COMMUNICATION NETWORKS

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The invitation to develop this paper for a program on Systems Theory Uses in Organizational Communication and Public Relations asked that I discuss recent work on the analysis of communication networks within organizations with an eye toward whether there might be implications for the study of external organizational communication. Because systems theory applied to human organizations implicitly or explicitly includes networks as a basic element of organizations (Beer,1980; Tichy,1980; Katz and Kahn, 1978), the interplay of a systems theory framework and the conceptual approach of network analysis is a natural one and fits the theme of the program.

The objectives of this paper are, first, to develop a systems theory/ communication view of the nature of formal organizations and, second, to illustrate the notion of wholistic organizational communication networks in organizations which include both formal and informal contact patterns. The final section will explore ways each might be helpful in studying the impact of internal organizational functions on external relationships and outcomes, or the impact of the suprasystem on internal relationships and functions.

The Nature of Organizations

To depart from a common baseline, we will begin with an overview of the traditional approaches to defining formal organizations. How are formal human organizations -- or complex organizations as they are sometimes

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called-- described in the organizational behavior and management literature? From several sources, but owing largely to Tannenbaum (1966), the following list is a synthesis of the characteristics of formal organizations typically found in the literature. Not all the items in the list are exclusively those which might allow us to differentiate a formal organization from another social collectivity. Overall, the combination of elements usually is intended to describe the salient features of any organization.

1. Purpose. Organizations exist to accomplish purposes or goals which could not be accomplished by individuals acting alone (Beer, 1980). The generic purpose of organizations is produce goods or services efficiently. These goods or services may be for consumption external to the organization, as is the typical case, or may be consumed entirely by the members of the organization. A bridge club which exists for social purposes or a fraternal order are examples of the latter.

The term efficiently deserves emphasis. It is often said that profit is the bottom line for profit-making organizations, but profit is only a measure of efficiency, albiet an imprecise one (in non-profit and governmental organizations, efficiency is even more imprecisely calculated or difficult to calculate). Efficiency is an input-output ratio and is more pervasive as a "bottom line" measure than is often recognized by organizational members or in the organizational behavior literature.

In essence, the logic of the design of an organization -- at least from a "machine theory" framework -- hinges on efficiency as an underlying assumption. The very act of organizing serves the objective of efficiency.

2. Specialization (Division of Labor). The notion of specialization means that members perform different functions within the organization. The overall purpose or task of the organization is broken down into smaller seqments which one person can accomplish in a normal work day or work week. Davis and Newstrom (1985) call this "functionalization," the vertical division of labor in an organization. Specialization undergirds the process of job analysis and job design.

3. Coordination of Effort. Coordination is the concomitant of specialization. The tasks of individuals which were created following a specialization guideline must now be integrated so that all the pieces result in the overall output of the organization.

4. Authority. Authority is the formal right of a person by virtue of their position to influence or control the behavior of other organizational members. Authority operationalizes coordination. It is implemented through a formal hierarchial system in which persons in positions of higher rank are responsible for ensuring that the work of persons in positions below theirs in the hierarchy is accomplished.

5. Conformity. Conformity is the concomitant of authority. With organizational membership goes implicit or explicit agreement to conform to work-related rules, including submitting to the authority of persons of higher rank in the chain-of-command. Although the organization grants authority to persons in management positions, conformity is variable among and within organizations, and across situations. In democratic organizations or

organizations which members can leave without fear of reprisal or without serious economic or social loss, acceptance of super-ordinate authority may be highly variable among subordinate members.

6. Formal Role Prescriptions. A role prescription defines a member's role and the relationships they are to have with other roles in the organization. It operationalizes the authority hierarchy by specifying who reports to whom. If complete it also specifies non-authority work flow relationships. The latter do not normally show on the organizational chart but are working relationships with staff which are required by one's job; they are infrequently found in written job descriptions and usually are discovered or developed as part of the learning and socialization process of new members.

While most organizations publish an organizational chart which specifies hierarchial role relationships and job titles for role incumbents, some do not publish the second part of the formal role prescription -- the job activity description itself. All some organization members have to work with is a job title and knowledge of who are their boss and peers.

7. Order. Organizations can be characterized by two kinds of order: order within the organization and the regularity of the organization itself through time. The first type of order is related to the predictability of member behaviors and represents the success of role prescriptions (which implement specialization, coordination and authority) and the extent of conformity. The second type of order is related to stability and continuity and

repesents the success of the formal plan of the organization -- its survival through time.

8. Replaceability. In a machine theory sense, what is organized in an organization, at least before we add people, are roles and role relations. People as role incumbents are replaceable parts. From a strictly abstract point of view, it doesn't matter who fulfills a particular role in an organization as long as they are technically competent to accomplish the tasks assigned the role. In practice, how well a given person can fulfill the role relationship requirements through interpersonal skills is also important, but to varying degrees among organizations and organizational subunits.

9. Partial Inclusion. Not only are the members of an organization temporary role incumbents, they also do not devote their full time and energy to the organizational role. Each member fulfills other roles in their life -- family, community and social roles, for example, and roles in other formal organizations. Even in their primary work organization, they are more or less "9-to-5" incumbents of a work role.

10. Compensation. Organizational membership results in varying degrees and types of compensations for its members. In salaried work organizations, members are paid to perform their assigned role and, for most, pay is the basic reason they join a work organization. For non-salaried organizations -- those to which persons pay a fee to belong or for which they volunteer their membership when that is allowed -- the compensations are mostly psychological and social.

11. Technology. Even simple organizations normally will require some form of technology to accomplish their purposes. A bridge club needs a deck of cards and devices for recording scores; auto manufacturing firms need massive machinery to convert raw materials and assemble parts. Even long-winded professors need overhead projectors, or chalk and chalkboard, or pencils and paper! Hardly any organization escapes the need for technology at some level of complexity.

12. Communication System. From the symbolic representation of the organization in its logo, to the signs and symbols used to express status and rank and order within the organization, to the expression of the formal communication system in the organization's published hierarchy, to all the interpersonal relationships on a day-to-day basis, no human organization exists without communication among and between members and with its environment. What helps distinguish formal organizations from other human collectivities is the legitimization of an "official" communication system in role prescriptions and a hierarchy of authority.

Defining Characteristics. It is common in the literature to find a "short list" of the characteristics of formal organizations rather than the inclusive descriptive list above. The less inclusive lists focus on the characteristics which are seen either as more or less unique to formal organizations or as constituting the "necessary and sufficient" characteristics for a formal organization. The typical set is usually restricted to characteristics in the first half of the list described above, namely:

1. Common Goal or Purpose
2. Division of Labor

3. Coordination of Effort

4. Hierarchy of Authority

5. Formal Role Prescriptions

Conformity is usually subsumed under a discussion of authority and what makes it work.

The other characteristics in our inclusive list are quite clearly not unique to formal organizations. Unorganized small groups, for example, may be characterized by order which results from unwritten emergent group norms, and they certainly can be characterized by replaceability (depending on group size), partial inclusion, a communication system, and psychological or social compensation. They may or may not have anything which could be interpreted as technology.

Some of the other characteristics in the "short" list may also typify other human aggregates. For example, a small group may have an informal division of labor or coordination of effort. A group would have a purpose although it may be expressed only as the individual goals of the members. A clear example of such an individually expressed purpose in an unorganized social aggregate would be the audience for a movie; each member of the audience will have a personal reason for attending, but attaining that goal is not dependent in any way, in the short run, on other members of the audience (in the long run it could be, because the theater would go out of business if no other audiences came to movies).

A Systems Theory/Communication View. Systems theory concepts hold the promise of developing a more contemporary view of the nature of organizations. Linked with the vantage point inherent in communication theory and research the two suggest some innovative ways to conceptualize formal organizations.

Several organizational scientists have asserted that communication is a central concern in organizational theory. Barnard (1938) was one of the first:

> ...in any exhaustive theory of organization, communication would occupy a central place, because the structure, extensiveness, and scope of organizations are almost entirely determined by communication techniques.

Twenty years later, Leavitt (1958) also underlined the importance of communication:

> From management's perspective, we can think of ...(an organization) as an elaborate set of interconnected communication channels designed to collect and collate, analyze, and sort out information; also as a system for making decisions, acting them out, getting feedback information and correcting itself.

And twenty more years later, Katz and Kahn (1978) defined organizations from a systems perspective and characterized organizations as both energic and informational systems with the function of the information system being management of the energic system. On this backdrop their emphasis on the importance of communication is not surprising:

> The closer one gets to the organizational center of control and decision making, the more pronounced is the emphasis on information exchange.
>
> In this sense, communication -- the exchange of information and the transmission of meaning -- is the very essence of a social system or an organization. The input of physical energy is dependent on information about it, and the input of human energy is made possible through communicative acts. Similarly the transformation of energy (the accomplishment of work) depends on communication between people in each organizational subsystem and on communication between subsystems...
>
> Communication is thus a social process of the broadest relevance in the functioning of any group, organization or society. It is possible to subsume under it such forms of social interaction as the exertion of influence, cooperation, social contagion or imitation, and leadership.

What <u>is</u> surprising is how little communication theory and research is used in definitions of organizations or in the organizational behavior literature generally. It is time to attempt to fill that gap.

The following characterization of organizations derives from a systems theory and a communication viewpoint. Its intent is to specify the elements which are necessary in order to define a formal organization; this set of characteristics should allow classifying any social aggregate as part of, or not part of, the set called formal organizations.

1. Formal Boundary Criterion. Katz and Kahn (1978) define system boundaries as "...the types of barrier conditions between the system and its environment... Boundaries are the demarcation lines or regions for the definition of appropriate system activity, for admission of members into the system, and for other imports into the system. The boundary constitutes a barrier for many types of interaction between people on the inside and people on the outside, but it includes facilitating devices for the types of transactions important to system functioning." Miller (1978) defines a boundary more abstractly: "...the subsystem at the perimeter of a system that holds together the components which make up the system, protects them from environmental stresses, and excludes or permits entry to various sorts of matter-energy and information."

The boundary criterion for organizations determines who are, in Katz and Kahn's words, the "people on the inside and (the) people on the outside." It is a membership criterion which defines who is a member (component) of the organization (system) and who is not.

Although we tend to think of organizations in locational and geographic terms, a geographic boundary criterion alone is not useful for most research applications. For example, if we define the membership of an organization as anyone in a particular building even if that building houses all employees of the organization, other persons in the

building at a point in time -- clients, guests, wandering drunks -- would be included in the system's membership.

For the general case, one of two artifacts which are part of the organization's records provide the boundary criterion. For salaried organizations (i.e., organizations in which people are paid to belong and perform a role), the organization's payroll at any point in time is the formal boundary criterion. For non-salaried organizations (i.e., those in which people pay to belong), the dues-paid membership list at any point in time is the formal boundary criterion. The latter includes volunteer organizations because they normally maintain a list of volunteers (in-kind labor can be thought of as the equivalent of dues).

2. Collective Purpose. As previously defined, the organizational purpose is stated as some form of output -- a good or service.

The term "collective purpose" is used to imply that the organization's purpose is shared by members in the sense that they must work interdependently toward it. This allows for the fact that organizational members have individual goals which motivate their membership and the performance of their membership role; except for the organization's survival which ensures their job in the future, there is no assurance that members will be loyal to the purpose of the organization. Thus, the term "collective purpose" recognizes the classic dilemma of management: balancing the needs and goals of the organization with the needs and goals of the individual.

3. Formal roles which prescribe:

a. an incomplete communication network. The formal role

prescription specifies an individual's role relationships in the organization. These relationships are normally restricted to those in the organization to whom the incumbent reports and those in the organization who report to the incumbent, but may include critical work-flow relationships also. The network created by these prescriptions is by definition incomplete.

For our purposes, the prescription of an incomplete communication network is not different from the traditional concept of the organizational hierarchy except, so far, we are considering it only as a communication network and not as an authority hierarchy.

The amount of contact restriction caused by creating a hierarchy is evident with a simple example. An informal group of five persons without communication restrictions has a potential of 10 dyadic linkages among them [the formula is N(N-1)/2]. Five persons in an organizational hierarchy -- one manager and four subordinates -- also have an allowed potential of 10 dyadic linkages among them (although an authoritarian manager may interpret the hierarchy to mean there are only 4 linkages -- one each between himself and each subordinate). The common meaning of a hierarchy within a given administrative unit (an organizational family using Likert's linking pin definition) is that each person can communicate with all others: vertical with the manager and horizontal with peers. Considering only one organizational family, the prescribed network is not incomplete. It is necessary to add levels to the organization for the restriction of channels to become evident. If the four subordinates in the above example also have four subordinates each, there are a total of 21 persons in the unit and two levels of management. This is still quite a simple organization. But the

restriction of formal communication linkages is dramatic. From a potential of 210 linkages among the 21, the hierarchy permits only 50 (10 from the top management "family" plus 10 from each of the four lower level "families"). With larger organizations and more management levels the disparity between potential and permitted linkages becomes even more apparent.

b. management decision centers within the network. Nodes in the network are assigned authority to make certain decisions. What were only information control centers in the network now become authority centers and the authority hierarchy begins to emerge.

c. appropriate message types within the network. Influence and information messages are appropriate downward, information and support request messages are appropriate upward, and information and coordination messages are appropriate horizontally.

d. individual operative tasks. With this addition, the role is described for a person in terms of operative duties and responsibilities for that individual member.

If this set of characteristics was extended to include the effective fuctioning of an organization (which it is not), I would find it difficult not to include an informal communication system as a necessary characteristic. No organization could survive if it actually forced itself to rely totally for its communication system on the relationships prescribed in the organization's hierarchy of authority. This is especially the case because work-flow relationships, coordinative relationships, and other contacts arising out of regular and temporary job assignments seldom are formalized in written role prescriptions. Many, if not most, of these types of relationships couldn't be formalized, nor would it be efficient to attempt

to do so, because of the impossiblity of anticipating all necessary connections. But there needs to be more recognition in the organizational behavior literature and in management practice of the utility and importance of the work-related informal communication system.

Organizations as Communication Networks

One way of dealing with the problem of the known formal and the unseen informal communication structure within an organization is to conceptualize organizations as wholistic communication systems. This type of systems approach encourages studying an organization as a total communication network without distinction as to formal or informal communication structure. These and other distinctions can be ignored or can be treated as unique sub-networks (subsystems). The approach requires conceptualizing organizations as a set of individuals -- the boundary criterion identifies them -- who are interconnected by lines representing regular communication contact among them. As indicated above, structural distinctions such as authority, status, prescribed functions or relations, and spatial relationships are initially not considered. Information is sought only on communication contacts which have grown out of work relationships in the organization.

Based on these ideas, Schwartz and Jacobson (1977) developed the following research framework:

> The organization is conceived of as a bounded social system in which there is a relatively stable network of interpersonal linkages through which messages flow that affect the productivity and maintenance of the system. To some extent these dyadic links are prescribed by and reflect the formal structure, but the formal structure does not define the sociometric structure. In collecting and analyzing data, the formal structure is disregarded and information about dyadic communication linkage is obtained directly from network members. ... When assembled from all members, these topological maps take the form of a total organiza-

tional sociogram. ... The objective is to trace the actual functional communication system of the organization.

The theoretic foundation for this approach derives from Jacobson and Seashore (1951) who posit that "Organizational structure can be conceptualized in terms of communication events which connect pairs of individuals, and thus establish patterns of contact among individuals and groups" (emphasis added). The notion that the communication structure is a structure of events is important. Katz and Kahn (1978) citing Allport assert: "A social system is a structuring of events or happenings rather than physical parts and it therefore has no structure apart from its functioning." Miller (1965; 1978) defines the structure of a system as "the arrangement of its subsystems and components in three-dimensional space at a given moment of time." He defines process as "all change over time of matter-energy or information in a system. ... Process includes the on-going function of a system, reversible actions succeeding each other from moment to moment." The "map" of an extant communication structure represents the history of a process. It is reified and static as it unfortunately must be to fit the biological metaphor Miller suggests. Because of the temporal nature of message transactions, the data for defining a communication structure must include more than "a given moment in time." The data collection method must either record the multiplicity of messages in transit between all active dyads within a time frame sufficiently extensive to capture "regularized" linkages or it must trace the movement of a single message across multiple network nodes which also means using an extended time bracket rather than a single point in time. In other words, the methodology requires a "time exposure" of message tracings in order to reconstruct the structure of the communication system. Unfortunately, regardless of the historical regularity of the transactional process which forms the basis for such maps,

that structure is not a concrete system. Unlike the familiar organizational hierarchy which is relatively stable over short time periods, the maps of extant communication structures will change in as yet unknown ways over time.

In spite of these and other methodological issues, a growing amount of research within the conceptual framework sketched above has been completed. One of the seminal studies (Schwartz and Jacobson,1977) was aimed at studying elements of the structural configuration itself. Taking the concept of an articulation point from graph theory (see Figure I) and

Insert Figure I about here

defining an analogous network concept called a liaison role, this study produced a picture of the work-related communication structure of a professional organization of 142 members. Figure II shows the resulting configuration. It stands in stark contrast to the typical orderly, organizational

Insert Figure II about here

chart. The configuration is the extant, functional, work-related communication structure of the organization. Methodological questions excepted, it is the organization in ways the hierarchy cannot represent.

The research program sketched in this section, while just beginning, leads to ways of thinking about organizations and organizational problems -- and about research on them -- which are unique. Most of the research activity so far has focused on the internal communication structure and problems of organizations. Can the approach be of service to the study of external communication -- the relations of an organization with its environment(s) and the activities of persons in boundary spanning roles who work or communicate at the interface of the organization and its environment? The liaison, for example, is a boundary spanning role between extant internal

subsystems. Liaisons are persons who link two or more groups other than their own or two or more groups if they do not have membership in a group of their own. The critical importance of the liaison role within the organization is illustrated in Figure III; when the contacts of liaison persons are

Insert Figure III about here

removed, the communication structure breaks down except for a few isolated bridge contacts.

The liaison role, or a conceptually similar analog, could be appropriate to certain approaches to external communication studies.

For aditional studies and reviews of this research tradition, refer to Weiss and Jacobson (1955), Weiss (1956), MacDonald (1970), Jacobs (1971), Farace and MacDonald (1974), Farace, Monge and Russell (1977), and Rogers and Kincaid (1981).

Some Implications for Public Relations Research

The previous research on communication networks in organizations has focused entirely in internal organizational communication. Some of the ways network conceptions and research could be applied to external organizational communication/public relations are sketched below.

Boundary Spanners. Because of partial inclusion, everyone in the organization is a boundary spanner. Everyone is in touch with the organization's environment and this is recognized by management which promotes the idea that all employees are part of the organization's public relations staff. But obviously some individuals are more important boundary spanners than others for reasons such as linkages to priority audiences, officially assigned boundary spanning duties, or credibility as an external representative.

* Network methods could identify significant boundary spanners on both sides of the boundary and determine their communication function in terms of information and persuasion effects. Both inward and outward gatekeepers might be identified most efficently by network methods.
* By surveying critical external audiences, organizational members who are informal boundary spanners could be identified or the functions perceived to be served by formal boundary spanners could be assess ed.
* Network methods could be used to trace the internal flow and impact of information which boundary spanners obtain from the environment.
* The internal and external network activity and communication functions of boundary spanners could be determined under different environmental or organizational conditions; e.g., during an internal or external crisis.

Suprasystem Penetration and Resultant Effects. Beyond the functions of boundary spanners, what are the effects of communication penetration of general or specific audiences based on the organization's planned communication program but for unplanned events as well?

* Network methods could be used to assess message penetration of identified target audiences and unintended audiences. Penetration and impact by system level could be assessed.
* The structure and effects of linkages and message flows among relevant members of the suprasystem could be determined by network methods.
* The interlocking structure of the linkages among a boundary spanners contacts or the duplication of contacts among several boundary

spanners could be assessed.

Conclusion

Many other research applications of the conceptual and methodological approach of network analysis are possible according to one's research interests and ingenuity.

The concept of networks is embedded in the systems theory framework. Communication networks are crucial to the internal and external functions of an organization. Systems theory and network analysis each offer useful conceptual approaches to social and organizational research. Combined they can be a powerful intellectual underpinning and impetus for internal and external organizational communication research and its applications in the professioanl field of public relations.

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